NATIONAL WEATHER SERVICE POLICY DIRECTIVE 10-7
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Operations and Services

TSUNAMI WARNING SERVICES

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OPR: PR1 (R. J. LaDouce) **Certified by:** OS (G. Mandt)
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SUMMARY OF REVISIONS: This directive supercedes Weather Service Operations Manual (WSOM) Chapter F-60, Tsunami Warning Service, Issuance 96-1, dated 1-25-96 and OML 3-98, Changes In Criteria for Tsunami Warning In Alaska's Aleutian Islands, filed with Chapter F-60, dated March 23, 1998.

1. Tsunamis are a series of very long waves generated by any rapid, large-scale disturbance of the sea. Most are generated by sea floor displacements from large undersea earthquakes. Tsunamis can cause great destruction and loss of life within minutes on shores near their source, and some tsunamis can cause destruction within hours across an entire ocean basin. Most tsunamis occur in the Pacific region but they are known to happen in every ocean and sea. Although infrequent, tsunamis are a significant natural hazard with great destructive potential. They can only be dealt with effectively through programs of warning, mitigation, and education.

2. The objective of this policy is the protection of life and property and enhancement of the national economy through the National Weather Service (NWS) provision of tsunami warning services. Specific Tsunami Warning System (TWS) operational objectives are: a) to locate and size major earthquakes in the Pacific basin, b) to determine their tsunamigenic potential, c) to predict tsunami wave arrival times and, when possible, run-up on the coast, and d) to provide timely and effective tsunami information and warnings to the population of the Pacific to reduce the hazards of tsunamis, especially to human life.

To achieve these objectives, the NWS will operate a three-tiered TWS providing regional, national, and international warning services. The Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC) carries all three responsibilities while the West Coast/Alaska Tsunami Warning Center (WC/ATWC) carries regional responsibility. The international warning system provides watch/warning services to all of the nations of the Pacific who are members of the International Coordination Group for the TWS in the Pacific (ICG/ITSU), those who provide the TWS with supporting data, and those with access to PTWC bulletins. In support of warning operations, the TWS monitors a network of seismic and sea level stations throughout the Pacific basin and maintains a large and effective communications network.

3. This directive establishes the following authorities and responsibilities:

3.1 National Program Responsibilities The Director of the Office of Climate, Water, and Weather Services (OS) will serve as senior staff support to the Tsunami Program Manager.

Specific responsibilities of the OS are: a) Advise and assist the Tsunami Program Manager in the development of all policies and procedures. b) Work directly with Regional Directors and division and branch chiefs in the consideration of broad management decisions. c) Identify requirements for new and needed changes in existing plans, policies, and procedures affecting the TWS.

The Pacific Region Director will serve as the Tsunami Program Manager (TPM). The TPM will be the U.S. national contact point for matters involving the Intergovernmental Oceanographic Commission's (IOC) ICG/ITSU and with foreign governments and observatories regarding arrangements for operational matters (including data exchange), cooperative programs, and scientific exchanges.

3.2 Regional Headquarters. The Pacific, Alaska, and Western Regional Headquarters will: a) operate, monitor, and maintain the tsunami warning program within their area of responsibility (AOR) and provide regional guidelines and instructions to their field offices, as required. b) maintain liaison with international, national, state, county, and local emergency services agencies, as required. c) interact with WSH, the TPM, other regions, and other Federal, state, and local government agencies in planning improved tsunami warning services.

3.2.1 The Pacific Region Headquarters (PRH) administers and maintains PTWC and provides administrative and financial support to the International Tsunami Information Center (ITIC).

3.2.2 The Alaska Region Headquarters (ARH) administers and maintains the WC/ATWC.

3.2.3 The Western Region Headquarters (WRH) provides additional guidance to its field offices on the communication and disaster preparedness aspects of the tsunami program and establishes and coordinates regional program requirements with the Alaska and Pacific regions and WSH.

3.2.4 Disaster Preparedness. Each regional headquarters is responsible for implementing NWS policy for disaster preparedness activities for tsunami events and maintaining an effective regional disaster preparedness program. The regional disaster preparedness focal point will assist the Regional Director in coordinating and monitoring the region's disaster preparedness programs. Warning Coordination Meteorologists at NWS field offices will carry out tsunami disaster preparedness activities in their AOR with federal regional, state, county, and local management officials.

The regional tsunami warning centers also assist Regional Directors in implementing national and regional policies designed to ensure adequate public preparedness for tsunamis. This is done in close cooperation with the Federal Emergency Management Agency and state and local civil defense agencies.

3.3 General Tsunami Warning Center Responsibilities.

a. Each Center is responsible for detecting and locating earthquakes, determining their magnitudes, gathering and analyzing water level data and reports, issuing tsunami Warning, Watch, Advisory, and Information Bulletins, and for supplying those data to the other Center, to

the National Earthquake Information Center (NEIC), and to others, as appropriate. Centers, within their AOR, are responsible for the maintenance of the NWS tide, seismic, and telemetry equipment and for the conduct of monthly communications tests.

b. The Centers, in coordination, develop techniques necessary to upgrade and improve the operational aspects of the TWS and interact with the ITIC and others such as NOAA's Pacific Marine Environmental Laboratory and the academic community in order to stay abreast of research in tsunami generation, detection. and forecasting.

c. The Centers also serve as collection sites for geomagnetic and/or seismic data under agreements with the U.S. Geological Survey and other U.S. and foreign agencies.

3.3.1 West Coast/Alaska Tsunami Warning Center (WC/ATWC). The WC/ATWC, located at Palmer, Alaska, has the primary responsibility for the detection, location, and determination of magnitude of potentially tsunamigenic earthquakes occurring in the coastal areas of Alaska, British Columbia, Washington, Oregon, and California. It is responsible for the preparation and dissemination of tsunami warning, watch, advisory, and information bulletins to civilian and military officials in Alaska, British Columbia, Washington, Oregon, and California regardless of epicentral location. It has secondary responsibility for the detection and evaluation of earthquakes located outside its regional AOR. Copies of tsunami warning logs will be transmitted to the TPM and WSH for all events resulting in the dissemination of tsunami watches and warnings.

3.3.2 Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC). The PTWC, located at Ewa Beach, Oahu, Hawaii, has the responsibility for the detection, location, and determination of magnitudes for earthquakes occurring anywhere in the Pacific Basin. If these earthquakes are potentially tsunamigenic, PTWC prepares tsunami warning, watch, advisory, and information bulletins and disseminates them, exclusive of the WC/ATWC AOR, to the appropriate U.S. civil, U.S. military, and to foreign government concerns throughout the Pacific basin.

3.3.3 International Tsunami Information Center (ITIC). The ITIC will be operated for the United Nations Educational Scientific, and Cultural Organization's IOC. Located at the PRH, the ITIC was established upon request of the IOC and is maintained by the NWS to strengthen the TWS and to assist member nations in mitigating the effects of tsunamis throughout the Pacific. The Director, ITIC, will report directly to the appropriate IOC authorities on matters not affecting NWS operations or U.S. policy, and to the Pacific Region Director for administrative purposes.

4. Compliance with this directive will be monitored by the warning centers, the regions, the TPM and the AA utilizing defined performance measures.

5. This policy directive is supported by the references and glossary of terms listed in Attachment 1.

Signed by John E. Jones, Jr. for May 05, 2003

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John J. Kelly, Jr. Date
Assistant Administrator
for Weather Services

Attachment 1

References. This policy directive is supported by:

NWS Instruction 10-701: Tsunami Warning Center Operations
NWS Instruction 10-702: International Tsunami Information Center
NWS Instruction 10-703: Post-Tsunami Surveys

Glossary of Terms.

Area of Responsibility (AOR). The geographical area within which a Center has the responsibility for the dissemination of tsunami watches, warnings, and information bulletins and the provision of interpretive information to emergency managers and other officials.

Regional Tsunami Warning Center. A Center that is responsible for the detection of tsunamis in the ocean basin that pose a threat within its regional AOR; the prediction of their arrival time within the region, and if possible, coastal impact. The Center is also responsible for the provision, to those regional interests responsible for the life and safety of the population nearest the potential tsunami source, of the earliest possible warnings, watches, and advisory and information bulletins, as well as when appropriate, the extension, upgrading, or termination of these issuances. The requirement for rapid response demands that initial evaluation be based on minimal data.

National Tsunami Warning Center. A Center that is responsible for the detection of tsunamis in the ocean basin that pose a threat to United States national interests outside of a regional AOR, the prediction of their arrival time, and if possible, coastal impact; and the provision of timely and effective information and warnings to those national interests to reduce the hazards to human life and safety. Such information and warnings, based initially on seismic data only, should be provided in the least possible time to allow national interests to implement the required safety measures.

Regional Tsunami Warning. A bulletin, usually based only on seismic information without tsunami confirmation, initially issued as a means of providing the earliest possible alert to the population near the epicentral area of a potentially tsunamigenic earthquake. It places a restricted area in a condition that requires all coastal areas in the region to be prepared for imminent flooding. Subsequent bulletins are issued at least hourly or as conditions warrant to continue the warning, expand or restrict the warning area, or end the warning.

Pacific-wide Tsunami Warning. A bulletin issued by the PTWC after confirmation has been received that a tsunami has been generated in the Pacific that has caused damage or has the potential to cause damage at distances greater than 1000 kilometers from the epicenter and thus poses a threat to any populated area within the Pacific Basin.

Warning Cancellation. A final bulletin indicating that there is no longer the threat of a damaging tsunami to a Center's AOR. A cancellation is usually issued after an evaluation of sea

level data confirms that a destructive tsunami will not impact the AOR.

Final Warning Supplement. A final bulletin issued following a damaging or potentially damaging tsunami within a Center's AOR that poses a continuing threat. The bulletin provides guidance to local officials regarding when they can consider the threat to have passed based on their local tsunami conditions. The cancellation or all clear decision must be made locally.

Regional Tsunami Watch. A bulletin, usually based only on seismic information without tsunami confirmation, issued as a means of alerting the population within 1 to 3 hours travel time beyond the tsunami warning area of an earthquake with the potential to have generated a tsunami that may affect that area. Subsequent bulletins are issued at least hourly or as conditions warrant to expand the watch area, upgrade it to a warning, or end the watch and warning. A Regional Tsunami Watch may be included in the text of the message that disseminates a Regional Tsunami Warning.

Tsunami Advisory Bulletin. A bulletin issued to areas not currently in either warning or watch status when a tsunami warning has been issued for another region of the Pacific. An Advisory indicates that an area is either outside the current warning and watch regions or that the tsunami poses no danger to that area. The Center(s) issuing the Advisory will continue to monitor the event, issuing updates at least hourly. As conditions warrant, the Advisory will either be continued, upgraded to a watch or warning, or ended.

Tsunami Information Bulletin. A bulletin issued to advise participants of the occurrence of an earthquake in the Pacific or near-Pacific area with the evaluation that a potentially destructive tsunami was not generated. If the evaluation indicates the possible generation of a nondestructive tsunami, an investigation will be initiated and additional tsunami information bulletins will be issued as warranted until the investigation is concluded.

The Communications Plan for the TWS (COMM PLAN). A document that serves as the operational manual for the participants of the TWS. It provides a general history of the nature of tsunamis and a brief history of the warning service. The COMM PLAN lists the criteria for warning, watch, advisory, and information bulletin issuance, the preferred methods of communicating with TWS Member States, and gives examples of bulletin format and content. It also lists the tide and seismograph stations that participate in the TWS. It will be routinely updated each year in January and July.

Earthquake Magnitude. A logarithmic scale for indicating the size of earthquakes. For tsunami warning purposes the moment magnitude scale (based on P waves, surface waves, or both) will be used to size potentially tsunamigenic earthquakes. Other magnitude scales such as Ms, Mb, and Ml can be used as appropriate to size smaller non-tsunamigenic earthquakes and as a supplement to the moment magnitude scale for larger earthquakes.